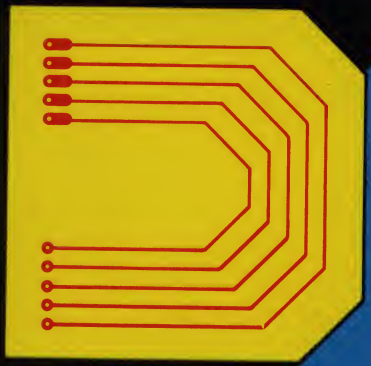
DIAGNOSTICS



CAT. NO.
26-3019

Radio Shack TRS-80 COLOR COMPUTER™

Diagnostic Program

Radio Shack®

A DIVISION OF TANDY CORPORATION
FORT WORTH, TEXAS 76102

First Edition

Introduction

The Diagnostic program for the Color Computer is designed to perform a thorough test of the computer hardware. Hopefully, you will be entertained, as well. The program consists of 11 separate test routines. Each routine evaluates a specific portion of the hardware.

If a problem is indicated when running through one of these tests, we suggest that you go to a Radio Shack store or dealer for the necessary repairs, in order not to void the Warranty. A Radio Shack dealer will also be able to supply you with information regarding BASIC and Expansion ROM CRC values. (See the following "BASIC ROM Test" and "Expansion ROM Test" instructions.)

Setting Up

First, make sure that the joysticks, cassette recorder and printer are properly connected to the computer. Turn on the TV and insert the Diagnostic Program cartridge in the slot on the right-hand side of the computer. Next, when you turn on the computer, a Main Menu listing the titles of the test routines, with their respective code letters will be displayed:

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DIAGNOSTIC TEST OPTIONS:

B BAS!C ROM TEST
E EXPANSION ROM TEST
Q QUICK RAM TEST
L LONG RAM TEST
V VIDEO TEST
R RS-232 TEST
S SOUND TEST
C CASSETTE TEST
K KEYBOARD TEST
J JOYSTICK TEST
P PRINTER TEST

A test can be chosen from the Main Menu in any order. A brief description of each test routine is given herein.

BASIC ROM Test

Press [B] for the BASIC ROM Test. This routine performs a CRC check of the BASIC ROM. A 2-byte CRC is generated, using a shift register algorithm, in which: $B_0 = B_{IN}$ XOR B_6 XOR B_8 XOR B_{11} XOR B_{15} XOR and B_{IN} is the next bit shifted in from ROM. The shift register continues to be shifted until every bit of the BASIC ROM has been used in B_{IN}.

The title, BASIC ROM TEST will first appear on the screen. The present byte of ROM is displayed while the routine is executing. When the test is complete, the message, BASIC ROM CRC IS will be displayed with the final value of the shift register used as the four-digit CRC. A problem exists if the value given on the screen is different from the value of your computer's ROM. (Consult your local Radio Shack dealer for this value.) To return to the Main Menu, push any key.

Expansion ROM Test

Press [E] to select the Expansion ROM Test. This routine is identical to the BASIC ROM Test, except that the CRC test is performed on the Expansion ROM (addresses 8000-9FFF), instead of the BASIC ROM (addresses A000-BFFF). There is a problem if the Expansion ROM CRC differs from the value given on the screen. (Ask a Radio Shack dealer for the correct CRC value.) Even if your computer does not have an Expansion ROM, a random CRC value will be assigned and displayed on the screen. Press any key to return to the Main Menu, when the test is concluded.

Quick RAM Test

Press [Q] to select the Quick RAM Test. This routine (which is run in the 3K color graphics mode) determines how much RAM is present and runs a short test on it. Every byte of RAM will be filled with a number and then checked, to see if the number is present. This process is repeated, using every number from Ø to FF. During this test, you will see a brief display of vertical stripes which quickly change colors.

If no errors are found, the message, RAM TEST COMPLETE . . . RAM IS GOOD will be displayed, when the test is complete. The amount of RAM present will also appear and should correspond to your computer's RAM size. If an error is detected, RAM ERROR . . . REPLACE CHIP––– will be displayed, with the number of the bad chip and the amount of RAM present.

This test takes about 4Ø seconds to run with 4K of RAM and almost 3 minutes with 16K. The Main Menu will reappear when you press any key.

Long RAM Test

Press [L] to select the Long RAM Test. This routine also tests the RAM, but is more thorough than the Quick RAM Test because it performs a "worst case" test. First, all of RAM is filled with ØØ, except for one byte which contains FF. All of RAM is then read and checked. This procedure is repeated, using every RAM location as the only one containing FF. In the second half of the Long RAM Test, this procedure is reversed; all of RAM is filled with FF, except for one byte which is cleared. All of RAM is then tested in the same fashion.

The Long RAM Test is run in the 2K color graphics mode. During the first part of the test, you will see a red rectangle (the FF byte) moving horizontally across a green background. The rectangle gets progressively lower, each time it crosses the screen. When the rectangle reaches the bottom of the screen, the region of RAM displayed is changed, so that the rectangle returns to the top of the screen. The rectangle will now begin making its way down again. A screen contains 2K bytes, so if you have a 16K computer, the rectangle will travel down the screen eight times. For a 4K system, it will take two times.

The display will be the same for the second half of the test, except that the colors will be reversed; the rectangle will be green and the background, red. With 4K of RAM, this test takes about 15 minutes. It will take about 4 hours with 16K. When the test is complete, you will see either a message indicating that the RAM is good, with the value of the RAM size or an error message, with the bad chip number. Press any letter to return to the Main Menu.

Video Test

Press [V] for the Video Test. This routine tests the different graphics modes of the VDG. The entire character set is first displayed in one color set, followed immediately by a display in the alternate color set. The graphics modes are then tested by running through them, with a 1.5 second delay in between modes. You will see from 2 to 24 clown faces, depending on the current VDG mode. With a 4K machine, the bottom third of the screen will not contain clown faces in the last two frames. A problem is indicated if the clown faces on a frame are

not uniform in color and size. After all modes have been reviewed, the Main Menu will reappear.

RS-232 Test

Press [R] for the RS-232 Test. You will have to use a special connector on the RS-232 port (available at Radio Shack stores) which shorts the input, output and status lines together. The output is toggled 65536 times, while the input and status lines are read and checked. This is done at a higher baud (4ØØØ) than would be used normally, so that the rise time of the amplifiers can be tested.

If no error is detected, the message, RS-232 PORT GOOD will appear. If an error is detected, RS-232 PORT BAD will appear on the screen. Make sure that the connector is properly hooked up. An error message can also occur, if you don't have a connector. Press any key to return to the Main Menu.

Sound Test

To select the Sound Test, press [S] . Turn up the volume of your TV. This routine tests both the 6-bit sound and the single-bit sound. First, the 6-bit sound is tested by putting out a sine wave that gradually changes from low to high frequency. The single-bit sound is then tested by putting out a short duration, high frequency pulse 7 times. The Main Menu stays on the screen during this short test, so that you can select another test immediately following this routine.

Cassette Test

Press [C] to select the Cassette Test. This routine tests the cassette port by storing a block of data on cassette tape, reading it back, and testing it to see if it is correct. First, insert a blank tape in the recorder. Before the data is sent from the computer to the cassette, the screen will ask IS RECORDER READY? Push the "PLAY" and "RECORD" buttons down and adjust the volume on the recorder. When you press any key, the block of data (Ø,1,2. . .FF) will be sent automatically to the cassette.

The screen will now instruct you to rewind the recorder. Push down the "PLAY" button and then press any key. The computer will read the data off the cassette, put it on the screen and check it. The message, CASSETTE GOOD or CASSETTE ERROR will appear, depending on whether or not an error was detected.

If an error message is displayed, check to see if the recorder is properly connected to the computer. Also, try re-adjusting the volume. Finally, make sure you're using a blank cassette. If you still get an error message, there could be a problem with either the recorder or computer. Press any key to return to the Main Menu.

Keyboard Test

When you press [K] for the Keyboard Test, the screen should be filled with K's. Whenever you press a key, the corresponding character should completely fill the screen. Simultaneously, you will hear tones, varying in frequency and ampli-

tude, depending on the key. Lower-case characters are displayed in green against a black background. Press [SHIFT] and [0] for upper-case (refer to the BASIC manual for the color computer). The colors will be reversed, the black characters will be displayed on a green background.

If the space bar, [ENTER] or [CLEAR] keys are pressed, the words, SPACE, ENTER, or CLEAR will be displayed, respectively. The right-arrow will appear as a slash (/), while the down-arrow will appear as a left slash (\ ). If the characters do not appear on the screen or there is a color discrepancy, there could be something wrong with either the keyboard or computer. Press the [BREAK] key to return to the Main Menu.

Joystick Test

First, make sure that the joysticks are properly hooked up to the computer and then press [J] for the Joystick Test. This test is run in the 64x64 color graphics mode, so that each detectable joystick position corresponds to one square on the screen. As the joysticks are moved, all squares corresponding to the particular position, turn to blue for one joystick and red for the other. If one of the fire buttons is pressed while moving the joystick, the color trail will disappear and you will see only the cursor. When you release the button, the trail of color will reappear.

There are two color sets, each containing four distinct colors. The color set can be changed by pressing the space bar. The background color can be changed to any of the four colors in the color set by pressing the [CLEAR] key. Any lines

or drawings currently on the screen will disappear when you press the [CLEAR] key. You can change the color of the two joystick trails by pressing the right and left arrow keys.

If you move a joystick too quickly, it may skip a few spaces. If this situation occurs, try moving the joystick slower. You should be able to move the cursor anywhere on the screen, with the possible exception of the corners. If the colors in the original color set (red, yellow, blue and green) are distorted, first, try adjusting your TV. In the case of a persistent problem with color, have your computer checked. Press the [BREAK] key to return to the Main Menu.

Test Printer

Press [P] for the Printer Test. The screen will ask, IS THE PRINTER READY? Make sure it is properly connected. When you press any key, this test will send the character set (20 to 7FHex) automatically to the printer. This test uses BASIC's printer routine, which requires the printer to have a handshaking line. You must be able to use the printer at 600 Baud. If the character set is not being printed, your printer could be malfunctioning (the computer hardware involved should have already been tested using the RS-232 routine). The Main Menu will automatically reappear when this test is concluded.

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Printed in U.S.A. **7-80**